**Summary**

Introduction to the basic techniques of image processing. Introduction to the development of image-processing software and to prototyping in JAVA. Application to real-world examples in industrial vision and biomedical imaging.

**Content**

- Characterization of continuous images. Image classes. 2D Fourier transform. Shift-invariant systems.
- Introduction to image analysis and computer vision. Segmentation, edge detection, objet detection, image comparison.

**Learning Prerequisites**

Required courses
- Signals and Systems I & II (or equivalent)

Important concepts to start the course
- 1-D signal processing: convolution, Fourier transform, z-transform

**Learning Outcomes**

By the end of the course, the student must be able to:
- Exploit the multidimensional Fourier transform
- Select appropriately Hilbert spaces and inner-products
- Optimize 2-D sampling to avoid aliasing
• Formalize convolution and optical systems
• Design digital filters in 2-D
• Analyze multidimensional linear shift-invariant systems
• Apply image-analysis techniques
• Construct image-processing software
• Elaborate morphological filters

Transversal skills

• Use a work methodology appropriate to the task.
• Manage priorities.
• Use both general and domain specific IT resources and tools